

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An arrangement for controlling combustion in a combustion engine, ~~whereby the combustion engine (1) comprises~~ comprising:

a combustion chamber;

~~(3);~~ a movable piston ~~(4) adapted to in the combustion chamber and movable in the chamber~~ for compressing a fuel mixture in the combustion chamber ~~(3)~~ so that self-ignition of the fuel mixture takes place~~[[,]]~~;

a crankshaft ~~(5)~~ driven to rotate by movements of the piston;

~~(4);~~ an inlet valve ~~(8)~~ to the combustion chamber ~~(3)~~ and an exhaust valve ~~(11)~~ from the combustion chamber; ~~(3); which arrangement comprises~~ a control unit operable for ~~(19) adapted to~~ controlling the self-ignition of the fuel mixture to an optimum crankshaft angle (cad_{iopt}) of the crankshaft within a load range (L_{tot}) of the engine, wherein the~~[[,]]~~ characterised in that said load range (L_{tot}) can be divided into at least two subranges (L_I , L_{II});

~~and the control unit (19) is adapted to being operable for~~ controlling the self-ignition of the fuel mixture towards an optimum crankshaft angle (cad_{iopt}) within a first subrange (L_I), the control unit being operable to perform by means of a strategy (I) which ~~entails~~ supplies a variable amount of hot exhaust gases ~~being supplied to or to be~~ retained in the combustion chamber ~~(3)~~, and within a second subrange (L_{II}), and the control unit being operable to perform by means of another strategy (II) which ~~entails~~ varies the effective compression ratio (c) in the cylinder ~~(2) being varied~~.

2. (Currently Amended) An arrangement according to claim 1, ~~characterised in that~~ wherein the control unit ~~(19) is adapted operable to initiating~~ initiate exhaust valve closure (evc) and inlet valve opening (ivo) within the first subrange (L_I) ~~in such a way that~~ for retaining a variable amount of hot exhaust gases from a combustion process ~~is retained~~ in the combustion chamber ~~(3)~~.

3. (Currently Amended) An arrangement according to claim 2, wherein characterised in that the control unit (19) is adapted operable to initiating initiate inlet valve closure (ivc_{opt}) within the first subrange (L_I) ~~in such a way as to result in~~ for causing an optimum effective compression ratio in the cylinder (2).

4. (Currently Amended) An arrangement according to ~~any one of the foregoing claims,~~ characterised in that claim 1, wherein the control unit (19) is variable for adapted to varying the effective compression ratio in the cylinder (2) within the second subrange (L_{II}) by initiating inlet valve closure (ivc) at a variable crankshaft angle.

5. (Currently Amended) An arrangement according to claim 4, wherein characterised in that the control unit (19) is adapted operable to initiating initiate exhaust valve closure (evc_{opt}) and inlet valve opening (ivo_{opt}) within the second subrange (L_{II}) at crankshaft angles at which minimum fuel consumption is obtained.

6. (Currently Amended) An arrangement according to claim 1, further comprising any one ~~of the foregoing claims, characterised in that the arrangement comprises~~ at least one hydraulic control system (18a, b) for periodically lifting the inlet valve (8) and the exhaust valve (11).

7. (Currently Amended) An arrangement according to ~~any one of the foregoing claims,~~ characterised in that the arrangement comprises claim 1, further comprising a first sensor (16) for detecting a parameter (p) which indicates the start of a combustion process in the combustion chamber (3), and a second sensor (17) for estimating the crankshaft angle (cad) of the combustion engine (1), and the control unit (19) is adapted ~~to~~ for determining the crankshaft angle (cad_i) for the start of the combustion process.

8. (Currently Amended) An arrangement according to claim 5, ~~characterised in that said~~ wherein the sensor is a pressure sensor (16) which detects the pressure in the combustion chamber (3).

9. (Currently Amended) An arrangement according to claim 7, ~~wherein or 8, characterised in that~~ the control unit (19) ~~is adapted to~~ is operable for comparing the actual crankshaft angle (cad_i) at the self-ignition of the combustion process with stored information concerning the optimum crankshaft angle (cad_{iopt}) for self-ignition of the combustion process and ~~for to using that the stored~~ information for controlling the self-ignition of the following subsequent combustion process.

10. (Currently Amended) An arrangement according to ~~any one of the foregoing claims, characterised in that the arrangement comprises~~ claim 1, further comprising an inlet line (7) for air supply to the combustion chamber and an inlet nozzle (10) for fuel injection into the combustion chamber (3).

11. (Currently Amended) A method for controlling combustion in a combustion engine ~~whereby wherein~~ the combustion engine (1) comprises a combustion chamber (3), a movable piston (4) ~~adapted to in the combustion chamber and movable in the chamber for~~ compressing a fuel mixture in the combustion chamber (3) so that self-ignition of the fuel mixture takes place, a crankshaft (5) driven to rotate by movements of the piston; (4), an inlet valve (8) to the combustion chamber (3) and an exhaust valve (11) from the combustion chamber; (3), ~~which~~

the method comprises the step of comprising

controlling the self-ignition of the fuel mixture towards an optimum crankshaft angle (cad_{iopt}) within a load range (L), comprising ~~characterised by~~ the steps of dividing ~~said the~~ load range (L) into at least two subranges (L_I , L_{II}) and ~~of~~ controlling the self-ignition of the fuel mixture towards an optimum crankshaft angle (cad_{iopt}) within a first subrange (L_I) by ~~means of~~ a strategy (I) which ~~entails~~ supplies a variable amount of hot exhaust gases ~~being supplied to or retained~~ retains the hot exhaust

gases in the combustion chamber (3), and within a second subrange (L_{II}) by ~~a means of~~ second strategy (II) which varies ~~entails~~ the effective compression ratio (c) in the cylinder (2) ~~being varied~~.

12. (Currently Amended) A method according to claim 11, further comprising ~~characterised by the step of~~ initiating exhaust valve closure (evc) and inlet valve opening (ivo) within the first subrange (L_I) ~~in such a way~~ that a variable amount of hot exhaust gases from a combustion process is retained in the combustion chamber (3).

13. (Currently Amended) A method according to claim 12, further comprising ~~characterised by the step of~~ initiating inlet valve closure (ivc_{opt}) within the first subrange (L_I) ~~in such a way~~ as to result in an optimum effective compression ratio in the cylinder (2).

14. (Currently Amended) A method according to claim 12, wherein ~~any one of the claims 11-13 above, characterised by the step of varying~~ the effective compression ratio in the cylinder is varied (2) within the second subrange (L_{II}) by initiating inlet valve closure (ivc) at a variable crankshaft angle.

15. (Currently Amended) A method according to claim 14, further comprising ~~characterised by the step of~~ initiating the exhaust valve closure (evc_{opt}) and the inlet valve opening (ivo_{opt}) within the second subrange (L_{II}) at crankshaft angles which result in minimum fuel consumption.

16. (Currently Amended) A method according to claim 11, further comprising ~~any one of the claims 11-15 above, characterised by the step of~~ lifting the inlet valve (8) and the exhaust valve (11) by ~~means of~~ at least one hydraulic control system (18a, b).

17. (Currently Amended) A method according to claim 11, further comprising ~~any one of the claims 11-16 above, characterised by the steps of~~ detecting a parameter (p) which indicates the start of a combustion process in the combustion chamber (3), ~~of~~ estimating the crankshaft angle (cad) of the combustion engine (1), and ~~of~~ estimating the crankshaft angle (cad_i) at the start of the combustion process.

18. (Currently Amended) A method for according to claim 17, further comprising ~~characterised by the step of~~ detecting the pressure in the combustion chamber (3).

19. (Currently Amended) A method according to claim 17, further comprising ~~or 18, characterised by the steps of~~ comparing the actual crankshaft angle (cad_i) at the self-ignition of the combustion process with stored information concerning the optimum crankshaft angle (cad_{iopt}) for self-ignition of the combustion process, and ~~of~~ using that information for controlling the self-ignition of the following combustion process.

20. (Currently Amended) A method according to ~~any one of claims 11-19 above, characterised by the steps of~~ claim 11, further comprising supplying air to the combustion chamber via an inlet line (7) for injecting fuel into the combustion chamber (3) via an injection nozzle (10).